

Nuclear Thermal Propulsion (prior to FY15: Nuclear Cryogenic Propulsion Stage)

Completed Technology Project (2011 - 2015)



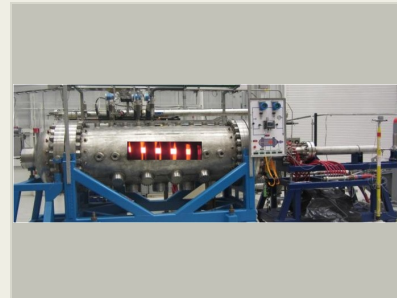
Project Introduction

A key goal of the project is to address critical, long-term nuclear thermal propulsion (NTP) technology challenges and issues through development, analysis, and testing of NTP hardware so NTP systems can be an affordable and viable in-space propulsion candidate for future HEO missions. An important NTP technology challenge is advancing the maturity of the NTP fuel by confirming that NTP fuels from the previous NERVA/Rover period can still be made and can perform as demonstrated in the past. First generation NTP systems and fuel technologies that are consistent with and can meet requirements of the initial crewed Mars Surface Missions will be the primary focus for NTP hardware development/testing for the project. AES completed this project at the end of FY15 (September 30, 2015). In FY16, STMD will initiate a new nuclear thermal propulsion activity within their Game Changing Development Program with a different focus. (Prior to FY15, the project name was: Nuclear Cryogenic Propulsion Stage Project)

Key NTP project objectives are to conduct preliminary design, fabrication, and test of representative fuel samples and partial length fuel elements for previous NERVA/Rover fuels types to verify that these fuel forms can still be made and perform as demonstrated in the past; further define preliminary NTP system concept designs that can meet the requirements for Crewed Mars Surface Missions requirements and serve as a basis for the candidate NTP fuel elements/types for both a smaller demonstration sized engine (~16 klbf) and a larger Mars Crewed Vehicle sized engine (25 klbf); and using the results of the above efforts as well as other heritage NTP data, develop fuel downselection criteria and recommendations to support an NTP fuel type leader selection. This NTP fuel leader selection, graphite composite fuel, was made in March 2015. (Prior to FY15, the project name was: Nuclear Cryogenic Propulsion Stage Project)

Anticipated Benefits

Not applicable to currently funded missions.



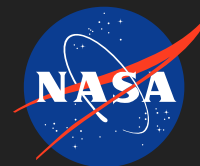
Nuclear Thermal Propulsion (NTP)

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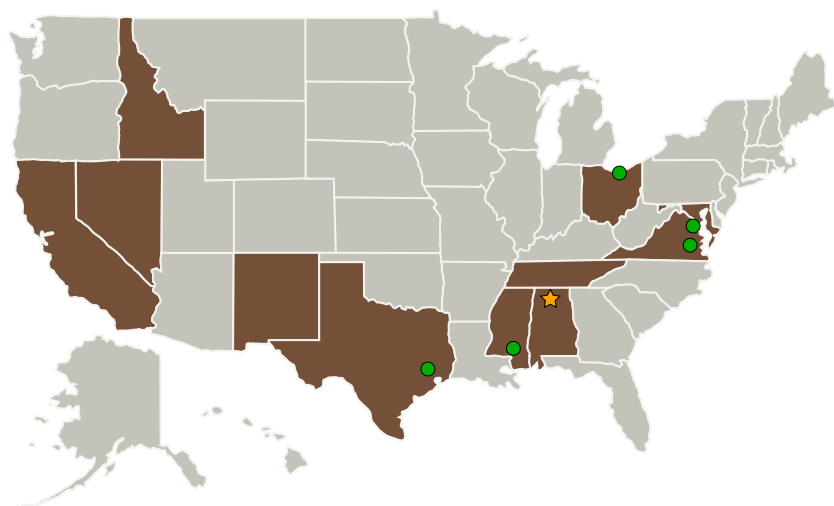
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Primary U.S. Work Locations and Key Partners



Organizational Responsibility

Responsible Mission Directorate:

Exploration Systems Development Mission Directorate (ESDMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Exploration Capabilities

Project Management

Program Director:

Christopher L Moore

Project Manager:

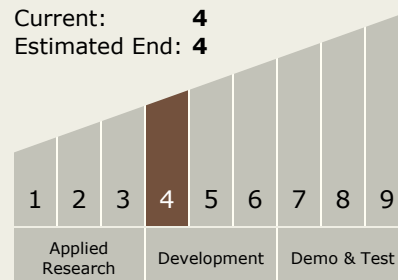
Doyce P Mitchell

Principal Investigator:

Michael G Houts

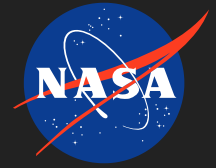
Technology Maturity (TRL)

Start: 4
Current: 4
Estimated End: 4



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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Aerojet Rocketdyne Holdings, Inc.	Supporting Organization	Industry	El Segundo, California
Center for Space Nuclear Research	Supporting Organization	Industry	
Department of Energy(DoE)	Supporting Organization	US Government	Washington, District of Columbia
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
● NASA Headquarters(HQ)	Supporting Organization	NASA Center	Washington, District of Columbia
● Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi

Primary U.S. Work Locations

Alabama	California
District of Columbia	Idaho

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Technology Areas

Primary:

- TX01 Propulsion Systems
 - TX01.4 Advanced Propulsion
 - TX01.4.3 Nuclear Thermal Propulsion


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Primary U.S. Work Locations (*cont.*)

Maryland	Mississippi
Nevada	New Mexico
Ohio	Tennessee
Texas	Virginia

Project Transitions

 **October 2011:** Project Start **September 2015:** Closed out

Closeout Summary: To request closeout information for this project, please send an email with the Subject "TechPort Closeout Report Request" to hq-aes@mail.nasa.gov and specify which project closeout report you are requesting.

Images

**NTP**

Nuclear Thermal Propulsion (NTP)
(<https://techport.nasa.gov/image/1280>)